Indexing Media Filtration System for Long Duration Space Missions

Problem Statement

•*Accumulation of particulate matter over long duration space missions will challenge spacecraft filtration systems . Performance improvements are needed in service life, regenerability, and reduced to no crew-tended maintenance.*

•.The low-g environment provided by the Flights Opportunity program will help test the performance in the relevenat environment.

- Customer: AES ARREM

Technology Development Team

- R. Vijayakumar, Aerfil LLC, vijay@aerfil.com
- NASA POC: Juan H. Agui. NASA GlennResearch Center Juan.H.Agui@nasa.,gov
- Spectrum Filtration Pvt Ltd vbothra@spectrumfiltration.com
- Filtration Group, www.filtrationgroup.com

Proposed Flight Experiment

Experiment Readiness:

- The flight rig will be available to fly in August 2012..

Test Vehicles:

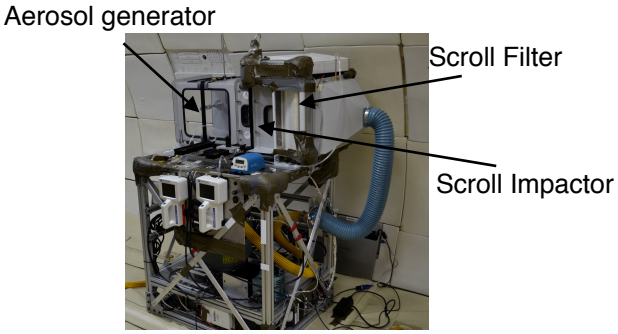
- Parabolic aircraft providing low gravity environment.

Test Environment:

- A smaller scale prototype of this experimental hardware was flown in various low-g environments (zero, lunar, and Martian). The current requirements are mainly for zero-g (priority) parabolas and a smaller set of either or both lunar and Martian g's.

Test Apparatus Description:

The test apparatus consists of a flow duct housing the test filters (scroll media and impactor), and accompanying equipment and instrumentation to provide visual flow information and measurements of filter performance.



Scroll Filter System and Flight Test Rig

Technology Maturation

- Demonstrated performance of full scale prototype in low-g and spacecraft cabin environments.
- Maturity steps: scaled prototype flight demo (2011), full scale flight demo (2012, 2013), ECLS flight demo (2015), DSH ground demonstration (2017),
- Schedule: Tentative integrated ECLS flight demo in 2015 (per 2012 OCT Roadmap)

Objective of Proposed Experiment

- To show the effect of gravity on:
  - Dust separation capability.
  - Collection of large particulates (that tend to settle out in 1-g).
  - Dust collection efficiency.
  - In-place media indexing..

• The flight data will be used to assess the performance of the hardware in low-g environments. Deficiencies in performance or operation will be identified and corrected in the next revision of system prior to the next flight opportunity.

Applicable Technology Areas : TA06 Life Support Systems and Habitations